

RESEARCH PROJECT SEGMENT

State: Alaska

Project No.: F-9-7

Name: Sport Fish Investigations
of Alaska

Study No.: G-I

Study Title: INVENTORY AND CATALOGING

Job No.: G-I-C

Job Title: Inventory and Cataloging of
Kenai Peninsula, Cook Inlet,
Prince William Sound, and
Fish Stocks

Period Covered: July 1, 1974 to June 30, 1975.

ABSTRACT

Surveys performed on five Kenai Peninsula lakes are discussed. Relative growth and survival rates are presented for rainbow trout, Salmo gairdneri, and coho salmon, Oncorhynchus kisutch, stocked in 16 area lakes. Results of electrofishing compared to gill nets are discussed. Pertinent historical data regarding stocking size, time and densities, as well as catch rates, are examined for various managed lakes.

An estimated harvest of 1,086 chinook salmon, O. tshawytscha, over 20 inches (50.8 cm) in length occurred on three lower Kenai Peninsula streams. Angler effort was estimated at 10,502 man-days.

Catch and effort in Cook Inlet off Deep Creek are estimated at 595 chinook salmon and 5,091 man-days.

Creel census activities on a ten-mile section of the Kenai River estimated a harvest of 1,409 chinook salmon by 11,568 man-days. Data regarding other species harvested are presented.

A tag and recovery program provided an estimate of the Arctic grayling, Thymallus arcticus, spawning population at 1,931 in an alpine lake.

RECOMMENDATIONS

1. Expand the creel census on the Kenai River to include that section of stream located between Beaver Creek and the Soldotna Bridge.
2. Explore possibilities of determining king salmon escapement into the Kenai River.

OBJECTIVES

1. To determine the environmental characteristics of the existing recreational fishery waters of the job area and to obtain estimates of existing and/or potential angler use and sport fish harvest.
2. To evaluate application of fishery restoration measures and availability of sport fish egg source.
3. To assist as required in the investigation of public access status to the area's fishing waters and to make specific recommendations for segregation of public fishing access sites.
4. To investigate, evaluate and develop plans for the enhancement of anadromous and resident fish stocks.
5. To provide recommendations for the management of sport fish resources in these waters and direct the course of future studies.

TECHNIQUES USED

Lake Surveys

Lakes were surveyed according to prescribed methods (Lake and Stream Survey Manual, 1971). A Hach Al-36-WR Kit was utilized to gather chemical data and a P-100 Ross depth finder was used to record bottom contours. A Raytheon recording fathometer (240-foot capacity) was used in preparation of volumetric maps. Fish populations were sampled with monofilament gill nets (125 X 6-foot) containing five mesh sizes ranging from 3/4-2 inch bar measure. Nets were fished approximately 24 hours.

Stocked lakes were sampled by methods described by Engel (1973). In four lakes comparative sampling was done with gill nets and an electric shocking boat modified from that described by Van Hulle (1968), and Roguski and Winslow (1969). Fork length was measured to nearest millimeter, while weights were measured to nearest 0.01 pound. Age of the samples were determined by length frequencies and scales that had been pressed into cellulose acetate and read by a Bruning 200 microfiche reader.

The electric shocking unit was comprised of an 18-foot aluminum riverboat (Smoker Craft), a 3,500 watt 115-230 VAC gasoline powered two-cycle generator (Homelite Model 10), a variable voltage pulsator (Coffelt Model VVP-3E), and a 12-foot aluminum "T" shaped boom (see Figure 1).

The riverboat was modified to accept a lift assembly which would allow an outboard motor to operate in shallow water; minimum depth necessary to operate was approximately one foot. Propulsion was provided by a 10 hp outboard (standard propeller) for operation in lakes and a 40 hp outboard (standard propeller) for operation in rivers.

A plywood platform (6.0 X 3.5-foot) was constructed and bolted to the forward section of the boat. A railing 35 inches high constructed from threaded black iron pipe was secured around three sides of the platform for safety. A console containing steering wheel, throttle and gear shift controls, switches for headlights, interior lights, generator cut-off switch, and variable voltage pulsator was secured to the boat approximately two feet forward of the transom. The lift positioning handle was secured immediately starboard of the console.

The generator when in use is set on a rubber tire just forward of the console. Male electrical connections (of different terminal arrangements to prevent accidental connection to the wrong location) are placed on leads from the cut-off control and the 115 VAC output position on the generator (Figure 2). These are accepted by corresponding female connections on the console. The 220 VAC input lead is connected to the variable voltage pulsator (VVP) via cannon plug. The 115 VAC current then runs through individual switches for interior lights (night lights plugged into standard outlet boxes) located forward of the seat and on the console and to the headlights (automobile type sealed beam lamps) located starboard and port under the platform. The output leads (connected by cannon plugs) run from the VVP to two color coded female receptacles located on the aft portion of the platform. These connect to the corresponding male attachments of the boom-electrode arrangement. A foot pedal control switch is connected to the VVP box via a cannon plug. The pedal control is placed on the platform when in operation. The boat is also equipped with a communication system consisting of two military surplus head sets and boom microphones connected by wires through an RCA KC4003 amplifier, rigged to operate without being keyed. The system allows communication between the dipper and motor operator and is a desirable safety feature.

The crew is composed of three people; a motor operator who also monitors the variable voltage pulsator, and two dippers, one of which operates the foot pedal.

The boom is constructed of 2-inch box aluminum welded into a "T". The wings of the "T" are 36 inches long. These are further extended 27 inches each by hinge arrangement which allows the outside sections of the boom to bend to the rear should the electrodes become entangled in bottom debris. The electrodes are flexible metal conduit 10 feet long suspended approximately 30 inches apart from a small section of PVC pipe attached to the aluminum boom; PVC is to insulate the electrodes from the boom. The unit can be operated with either two or four electrodes depending on physical and chemical properties of the water in which it is being used. The boom can be retracted or extended as desired.

Chinook Salmon Creel Census

Creel census techniques of the Kenai Peninsula chinook salmon punch card fishery have been previously described by Engel (1967) and Hammarstrom (1973).

Total minimum freshwater effort was determined by car counts conducted during each day of the fishery. Counts were multiplied by the average number of anglers per car to determine man-days.

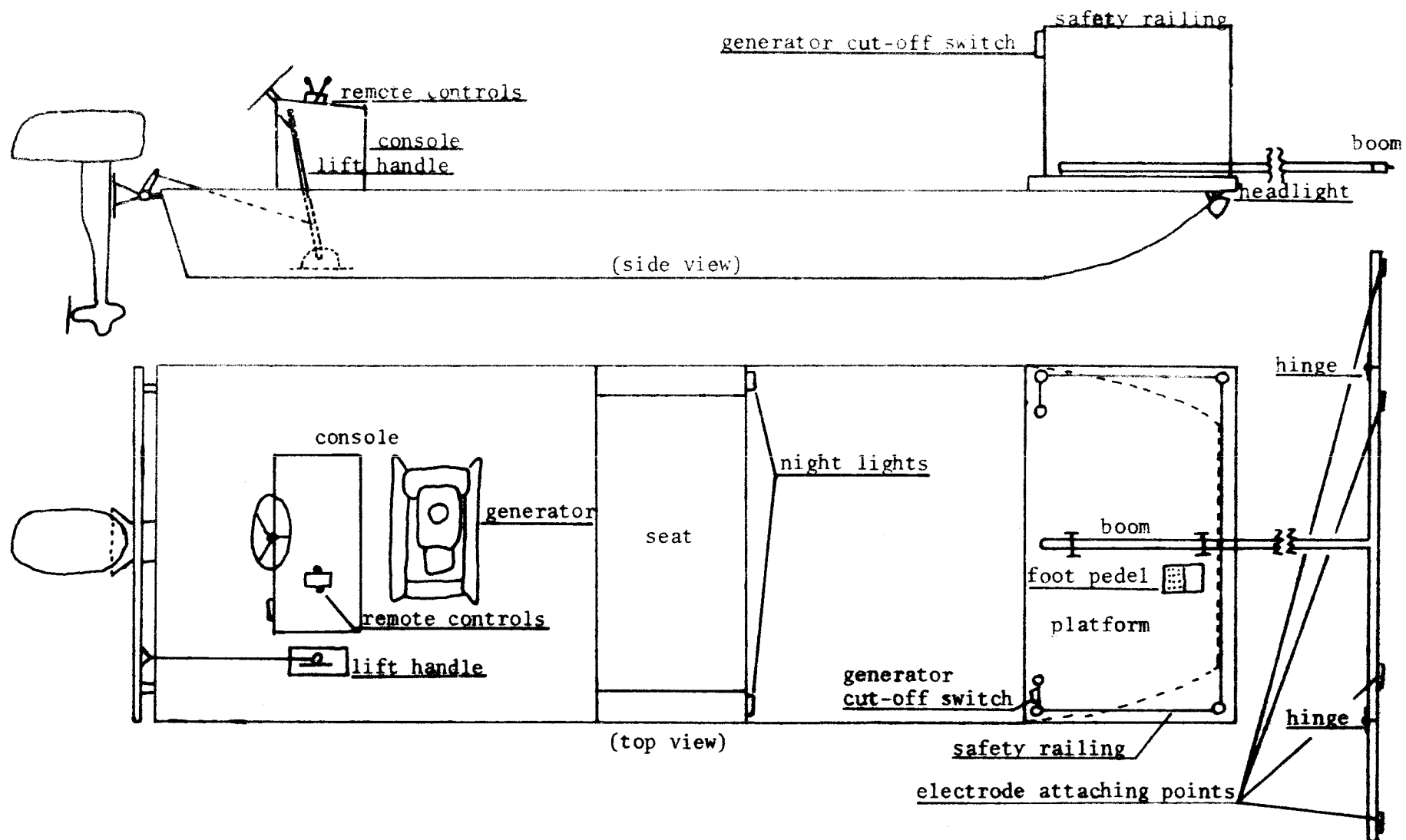


Figure 1. Schematic Diagram of Electric Shocking Boat Used on Kenai Peninsula, 1974.

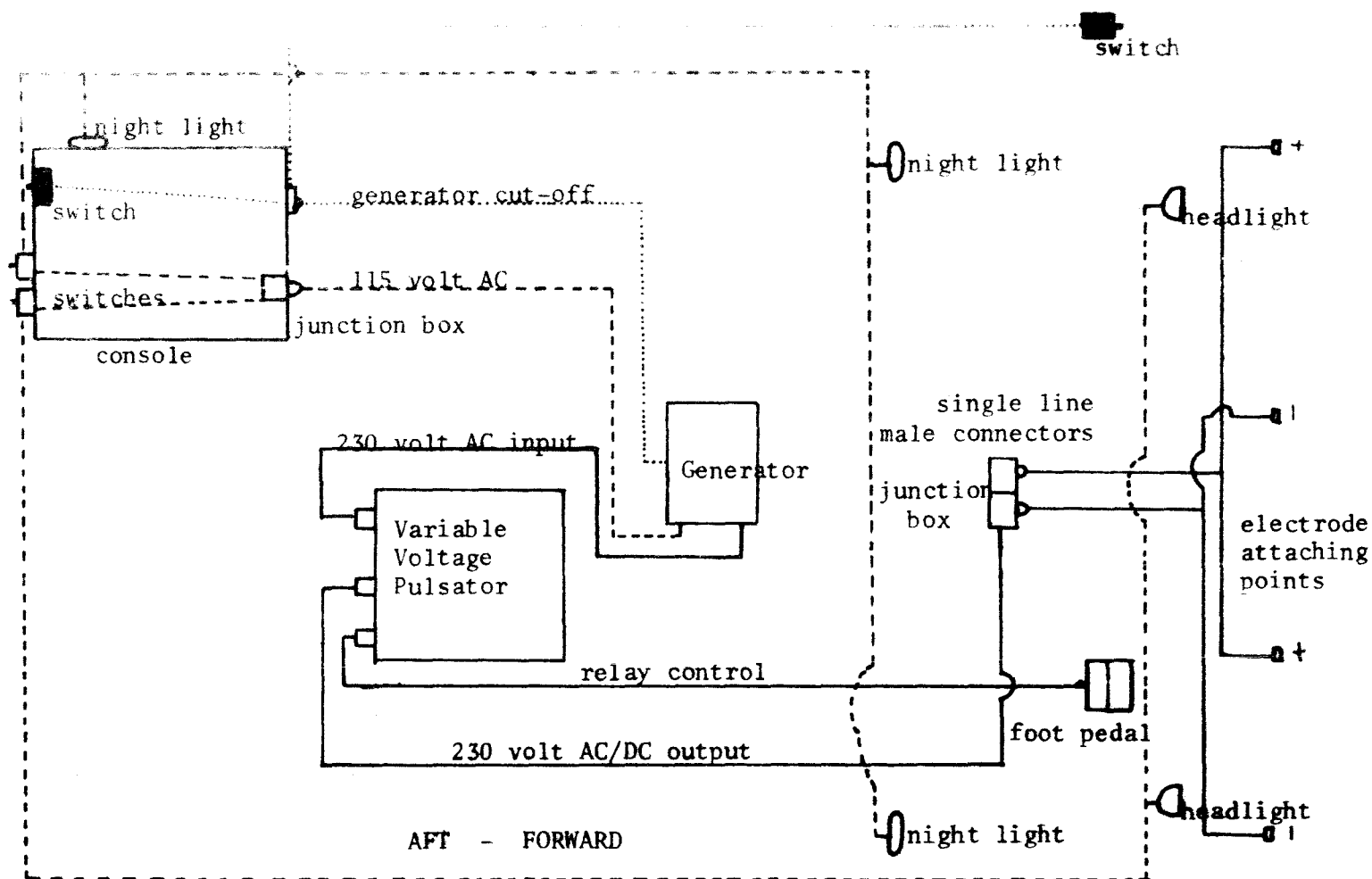


Figure 2. Schematic Wiring Diagram of Electric Shocking Boat Used on Kenai Peninsula, 1974.

Escapement was determined by the method described by Nelson (1971). Streams were flown in their entirety twice, once by Super Cub and once by helicopter.

Age composition and length frequency were determined from data collected by creel census during the fishery. Age was determined from scales that had been pressed into cellulose acetate and read by Bruning 200 microfiche reader.

A creel census previously described by Hammarstrom (1973) was conducted in the vicinity of Deep Creek to determine marine harvest and effort of chinook salmon.

Chinook salmon harvest and effort for the upper 10 mile section of the Kenai River from Naptowne Rapids upstream to Skilak Lake was determined by creel census. The sampling week was composed of five days, including every weekend day. Three weekdays were randomly selected by modified Neuhold and Lu (1957) design. The census was continuous from June 3 through August 31. Each sampling day in June and July consisted of 20 hours, 0400-2400, divided into eight 2.5 hour segments. Because less daylight was available during August, the sampling day was shortened to 15 hours, 0630-2130, divided into six 2.5 hour segments. Two segments of each day (again selected by modified Neuhold and Lu design) were monitored as to total boats fishing and total anglers per boat.

Interviews with fishermen were conducted throughout the day to determine catch per unit effort.

Bench Lake Grayling Population Estimate

During the spawning period of late May, a bag seine was used to capture spawning Arctic grayling at the outlet of Bench Lake. These fish were tagged with Floy FD-67F anchor tags with flag and a Mark II tagging gun. A ground survey of the entire spawning area was conducted to estimate spawning population. Approximately a month later variable mesh monofilament gill nets and rod and reel were used to capture fish that returned to the lake.

Swanson River Rainbow Trout Egg Take

In cooperation with the United States Fish and Wildlife Service an experimental egg take project was conducted on the Swanson River during late May. Adult rainbow trout were captured by means of seines and electric shockers, held until ripe, and spawned. Fertilized eggs were flown to Fire Lake Hatchery for incubation and rearing.

FINDINGS

Lake Surveys

Surface area of surveyed lakes ranged from 8-157 acres with maximum depths from 4-115 feet. Locations, acreage and maximum depths are presented in Table 1. Catch data is presented in Table 2.

Table 1. Locations, Acreage, and Maximum Depth of Kenai Peninsula Lakes Surveyed in 1974.

<u>Lake</u>	<u>Location</u>	<u>Surface Acreage</u>	<u>Maximum Depth (feet)</u>
Martha	T10S, R13W, Sec. 10	45	4
Nowak	T8N, R11W, Sec. 24	8	35
Rocky	T10S, R13W, Sec. 22	110	115
Seldovia	T10S, R14W, Sec. 2	157	83
Susan	T8S, R14W, Sec. 32	2.5	14

Table 2. Gillnet Catch Data from Four Kenai Peninsula Lakes Surveyed in 1974.

<u>Lake</u>	<u>Date Sampled</u>	<u>Species*</u>	<u>Catch</u>	<u>Range (mm)</u>	<u>Catch/Hour</u>
Martha	8/ 8/74	DV	96	100-510	4.17
		SS	12	80-110	0.52
Nowak	8/28/74	Stickleback observed	0	--	0.00
Rocky	8/ 8/74	DV	50	100-310	1.38
Seldovia	8/13/74	DV	154	80-300	4.53

* DV - Dolly Varden
SS - Coho salmon

Basic surveys were performed on five Kenai Peninsula lakes during 1974. Surveys were directed toward lakes in the Seldovia area. Lakes were analyzed to determine species present and potential for rehabilitation. Lakes were selected because of recent road construction in the immediate area.

Fish were taken in variable mesh gill nets in three of the five lakes. Dolly Varden, Salvelinus malma, were captured in Rocky and Seldovia lakes. Although not captured or observed, threespine stickleback, Gasterosteus aculeatus, are believed to inhabit these waters. Dolly Varden and rearing coho salmon, Oncorhynchus kisutch, were captured in Martha Lake. Spawning sockeye salmon, O. nerka, and stickleback were observed in this lake. No fish were captured in Nowak Lake but stickleback were observed. No fish were captured or observed in Susan Lake and it is believed barren due to dissolved oxygen deficiency.

Bathometric studies were performed on six Peninsula lakes. Surface areas ranged from 20-83 acres; maximum depths from 8-32 feet and volume from 145-749 acre feet. Data concerning these lakes are presented in Table 3 and Figures 3-8.

Table 3. Bathymetric Measurements of Six Kenai Peninsula Lakes Accomplished in 1974.

<u>Lake</u>	<u>Location</u>	<u>Surface Area (Acres)</u>	<u>Maximum Depth (Feet)</u>	<u>Average Depth (Feet)</u>	<u>Volume (Acre-Feet)</u>
Centennial	T2N, R11W Sec. 17, 20	25	20	7.7	192
Kidney	T7N, R11W Sec. 30	74	21	10.1	749
Limbo (Bonaparte)	T5N, R10W Sec. 16	20	20	7.2	145
Long Pine	T7N, R11W Sec. 9	60	8	3.9	235
Tarbo	T7N, T11W Sec. 16	40	15	9.5	382
Union	T5N, R10W Sec. 15, 16	83	32	8.6	714

Lake Stocking Evaluation

Hatchery-reared salmonids have been utilized since statehood to enhance existing fisheries and create new ones. Steadily increasing angler effort has warranted the use of hatchery-reared fish to supplement native populations.

Sampling during 1974 was conducted on 16 lakes with variable mesh gill nets. All lakes planted with rainbow trout, except Rainbow (Fetus Lake) which was void of fish prior to planting, and Hump and Island lakes, have been treated chemically with rotenone to eliminate competing species, usually stickleback. Pertinent data concerning 10 lakes stocked with rainbow trout are presented in Tables 4 and 5. Vagt Lake was not sampled this season as the fish were planted in July, and the fish would not have been large enough to capture with gillnets. Data from seven lakes stocked with coho salmon are presented in Tables 6 and 7.

Electrofishing was used in four lakes in conjunction with gill nets for comparative catch effectiveness. Two lakes stocked with rainbow trout and two with coho salmon were selected. Catch rates and length frequencies were compared. All electrofishing was done after dark.

In each lake sampled, except Longmare, the smaller fish of the stocked population seemed to be more influenced by the electric field than did the larger fish. Longmare's population was comprised of two year classes of rainbow trout, *Salmo gairdneri*, planted in 1973 and 1974. A higher percentage of younger fish escaped capture than did older fish. It was also observed that the larger fish would lay immobilized in the electric field longer than did the smaller fish, which is a reversal of what occurred in the other lakes.

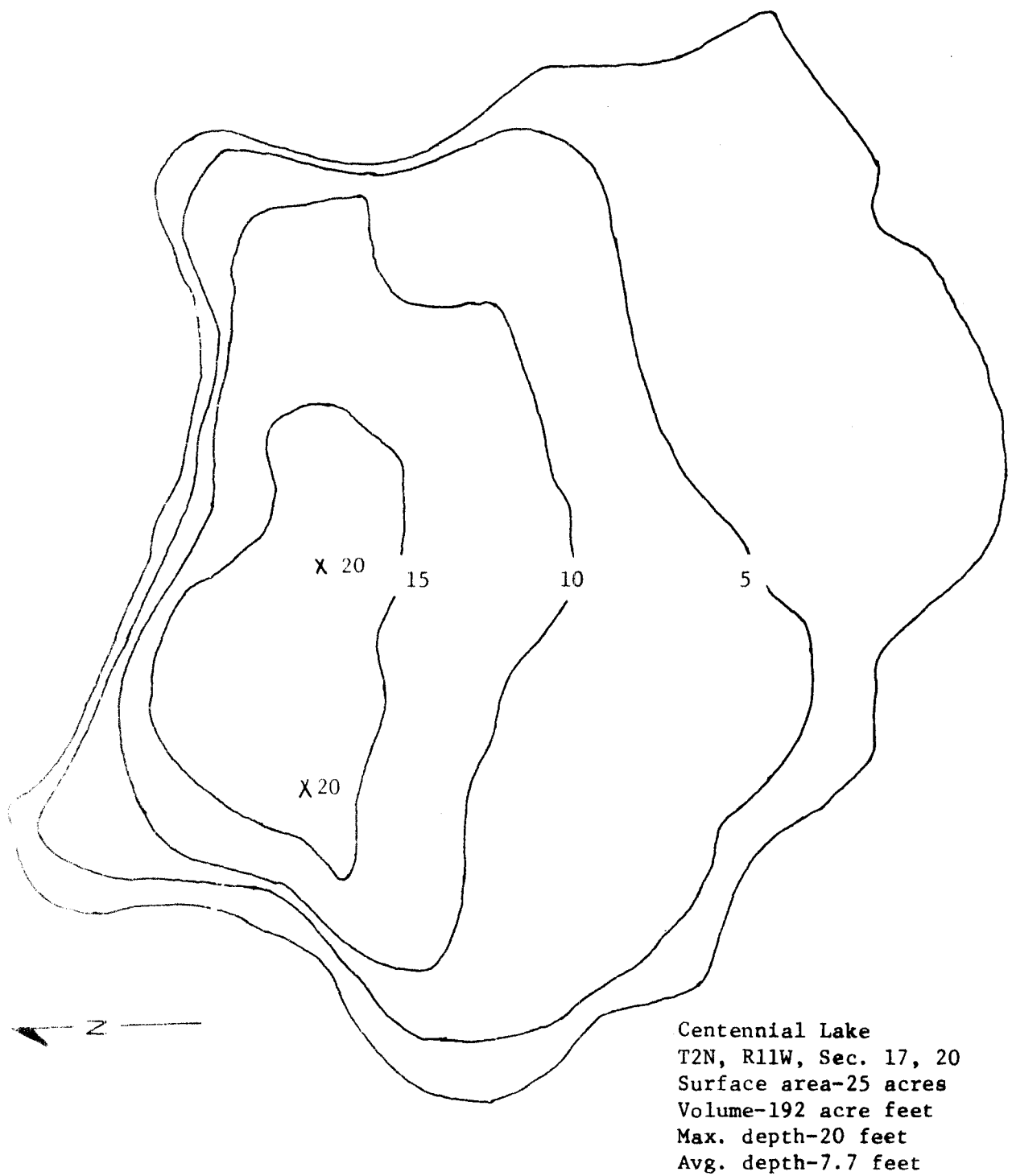


Figure 3. Volumetric Map of Centennial Lake

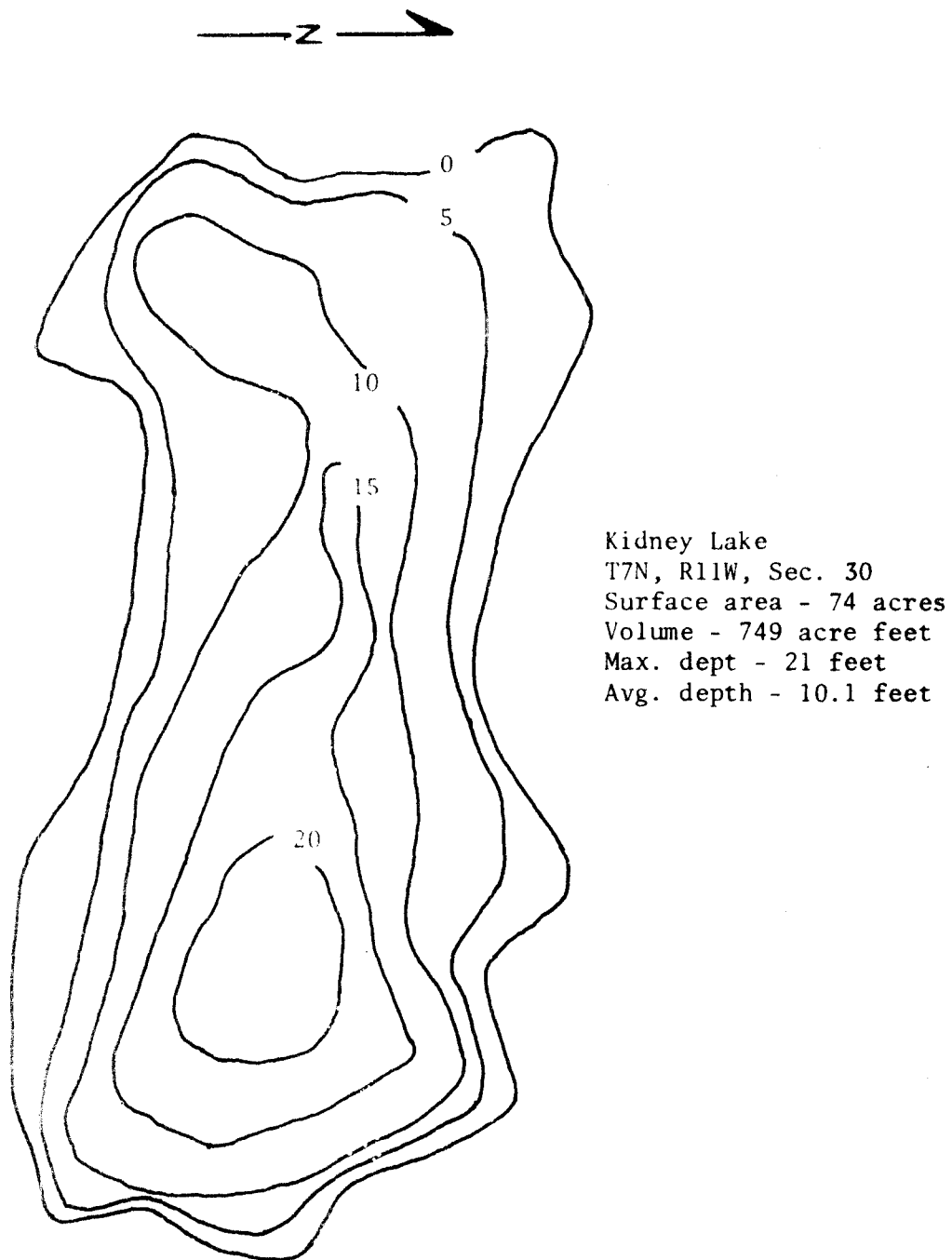


Figure 1. Volumetric Map of Kidney Lake.

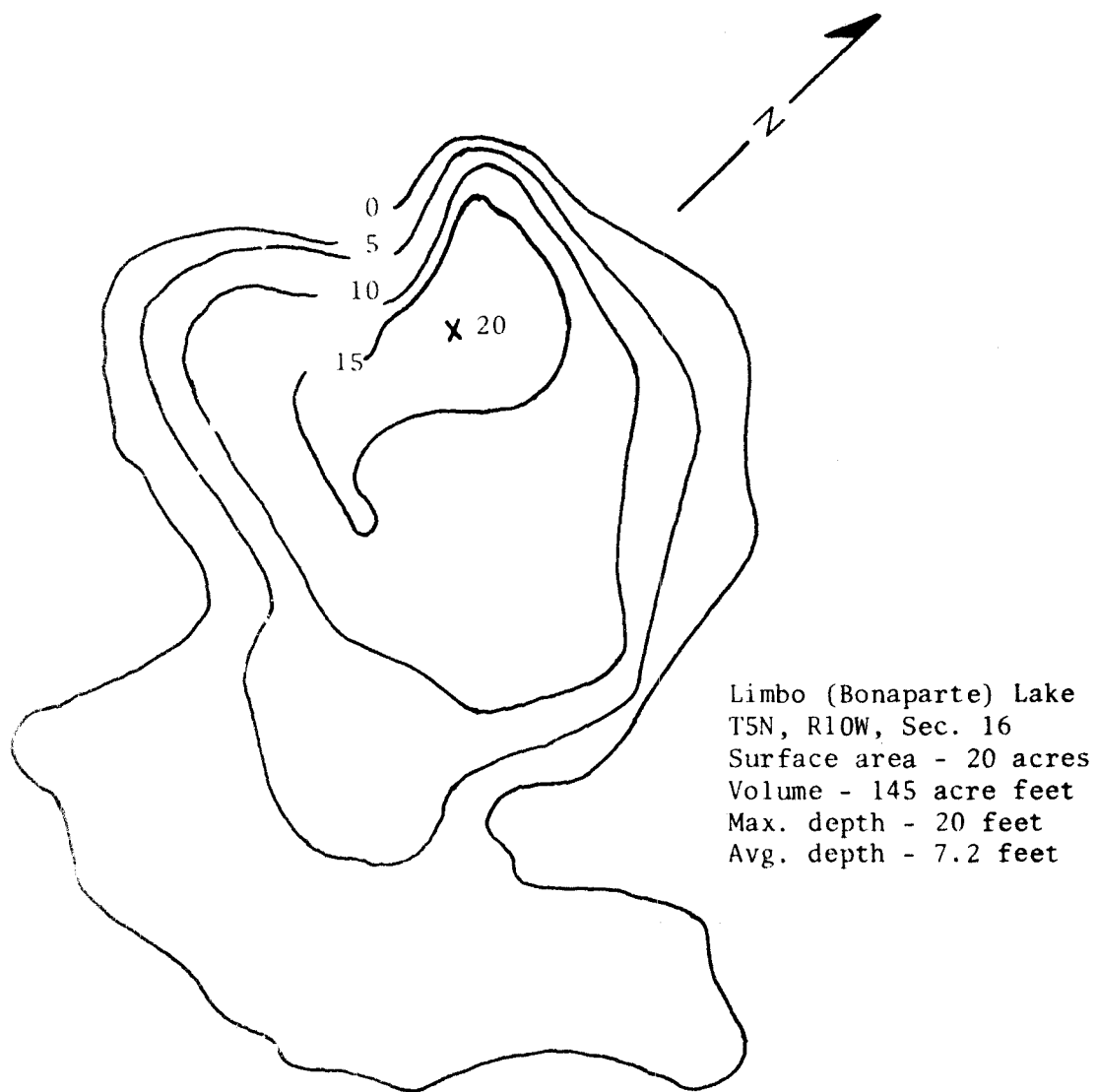


Figure 5. Volumetric Map of Limbo Lake.

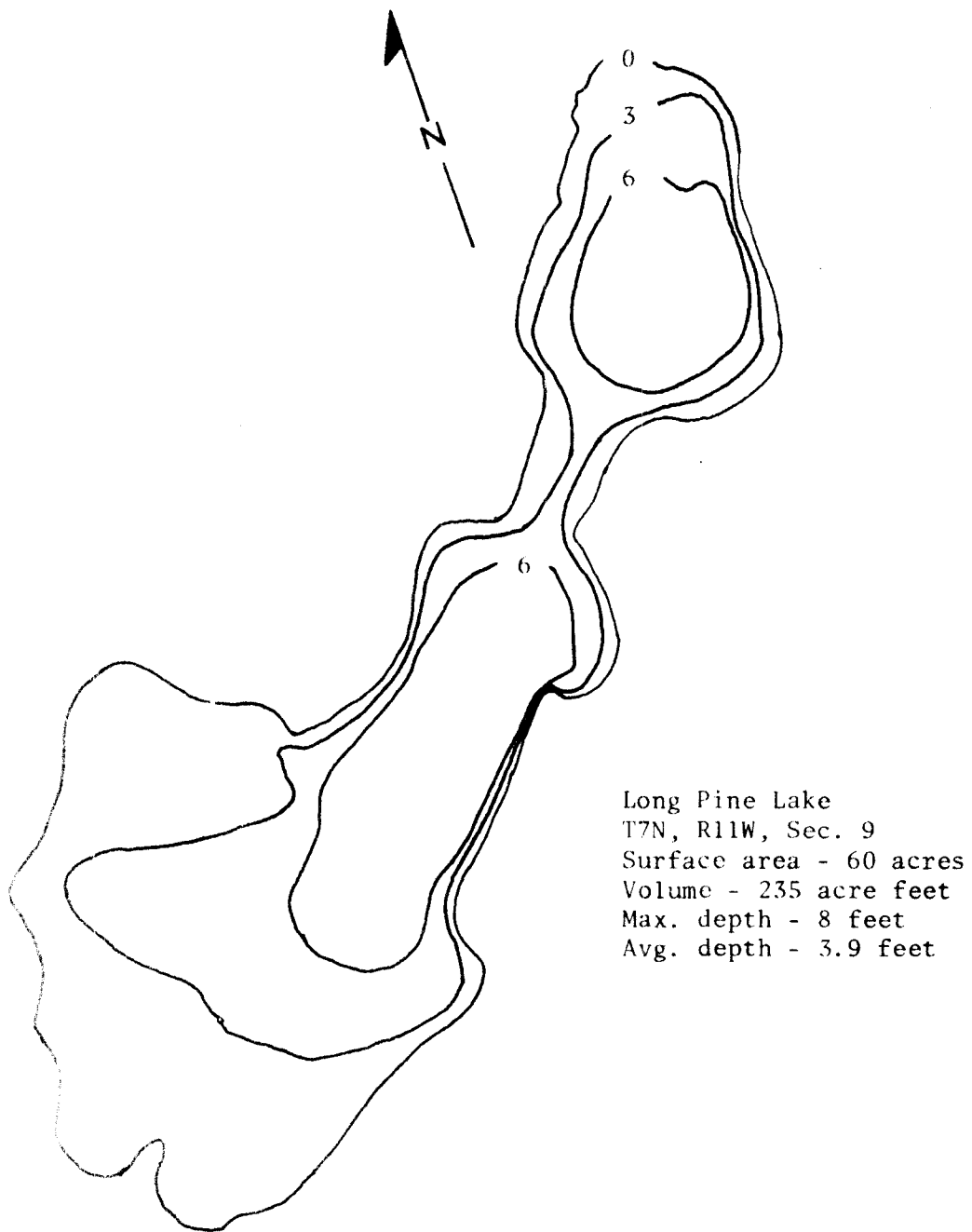


Figure 6. Volumetric Map of Long Pine Lake.

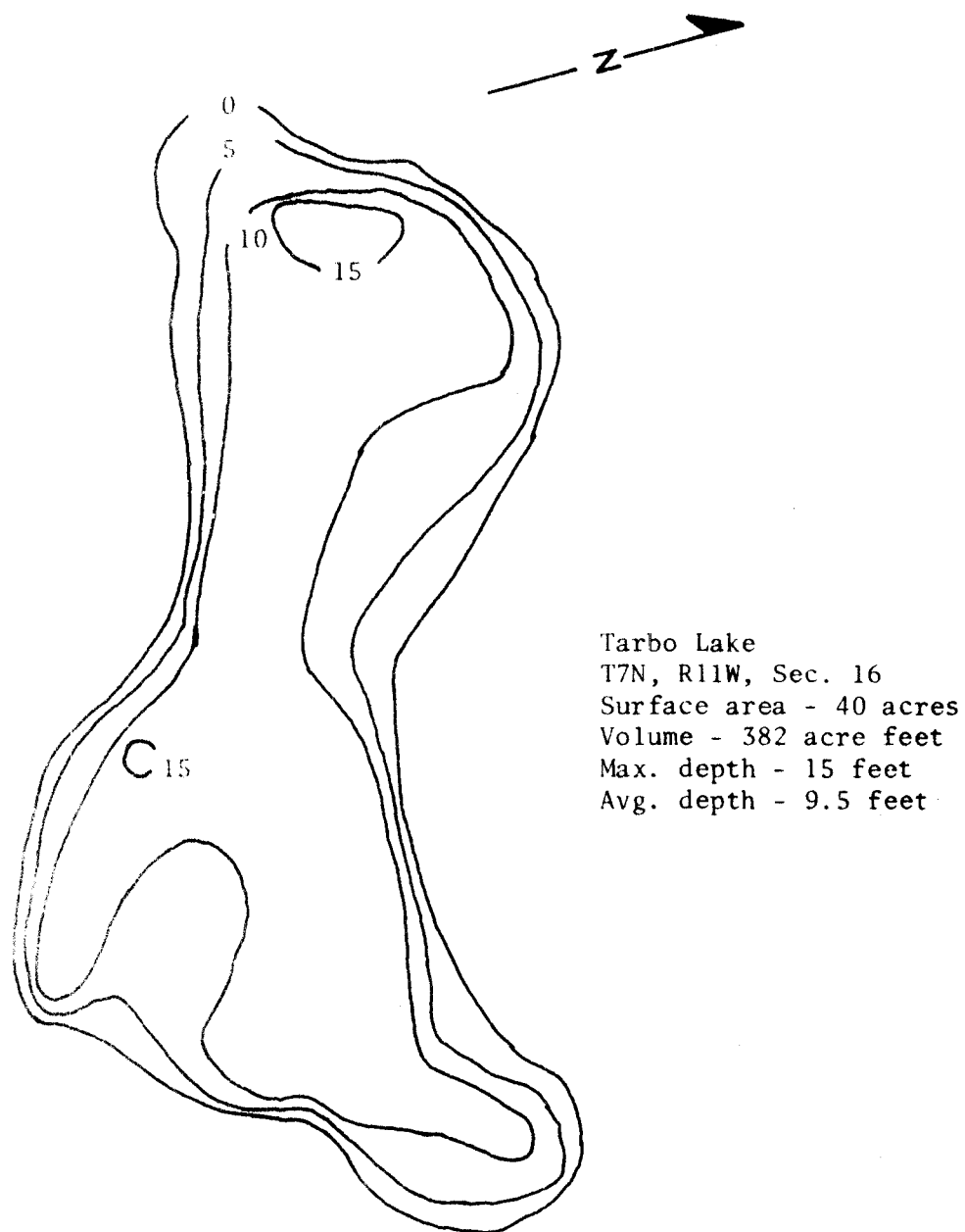


Figure 7. Volumetric Map of Tarbo Lake.

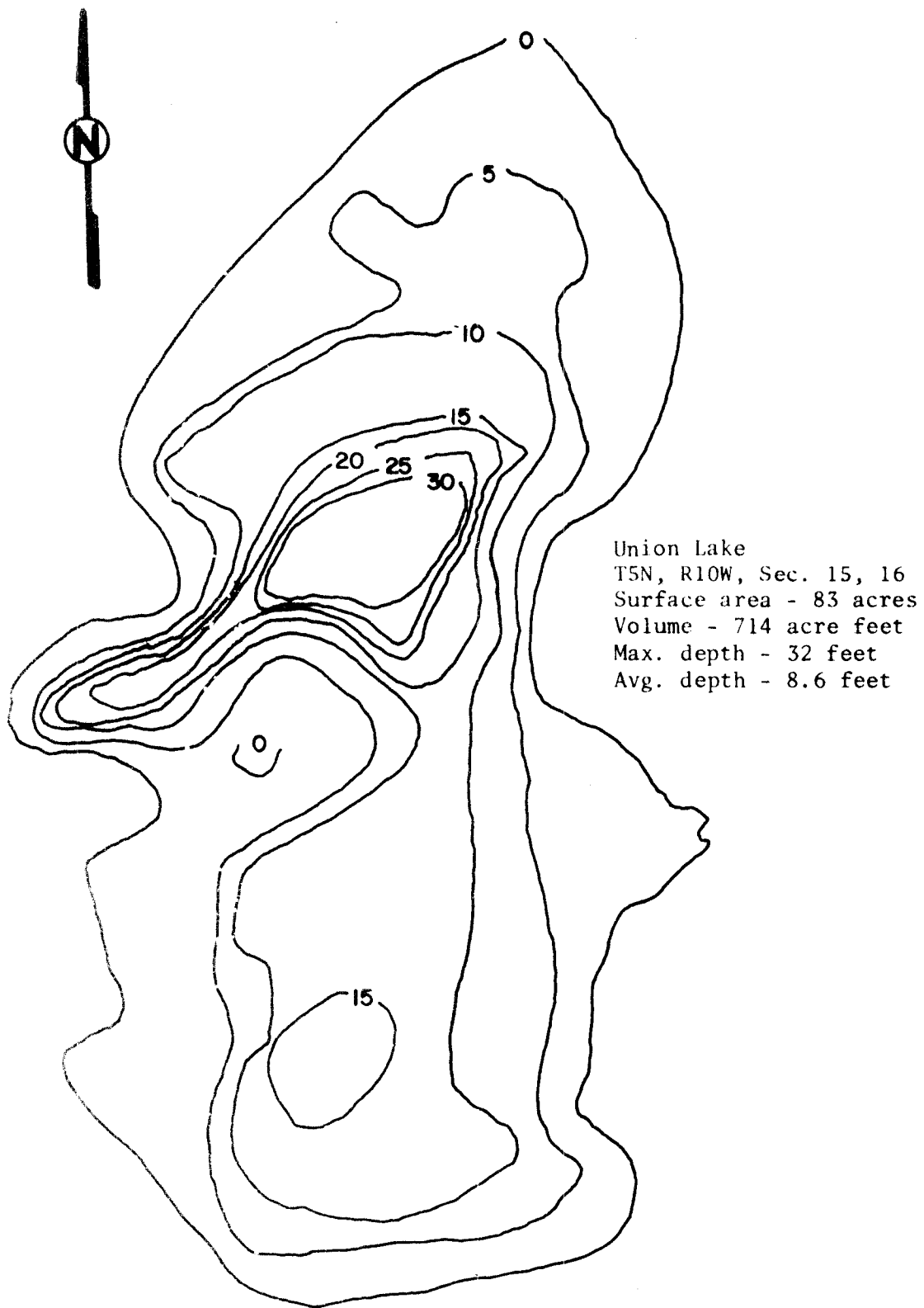


Figure 8. Volumetric Map of Union Lake.

Presently, there is no definitive data available on the unit and electrode arrangement used regarding the dimensions of the electric field, but it was observed that there was an avoidance factor. As long as there was an electric field in the water fish were observed darting away approximately two feet to as far as twenty feet, yet when the electric field was not being generated, very little avoidance was noted.

Two electrofishing units similar in construction were used in Bear Lake near Seward. The 445 acre lake is used as a rearing area for naturally and artificially propagated coho salmon as part of a continuing Sport Fish Division research project. The salmon captured were Ages 0 through II and ranged in size from 56-180 mm. Catch per hour was 645 fish, the highest recorded on the Kenai Peninsula.

Figure 9 compares the length data of electrofishing fish and gill net caught fish from the four lakes in which both methods were employed. The two curves seem to display the selectivity of each method. The electric shocking unit appears to select the smaller fish while the gill nets more readily capture larger fish. The length ranges are comparable, yet the two peaks are distinct. More testing will have to be done to evaluate the results as to which may be more representative of the true population. Data regarding each lake are presented in Figures 10 and 11.

Both Bernice Lake and Rock Lake are believed to have winter-killed during the past year. Dissolved oxygen readings taken during mid-March were low in both lakes; Bernice Lake recorded 0.8 ppm at the surface and 0.4 ppm at the bottom; Rock Lake was 1.9 ppm and 1.0 ppm, respectively. Gill nets captured only young-of-the-year fish in both lakes.

Chinook Salmon

Punch Card Fishery:

Harvest on Anchor River, Deep Creek, and Ninilchik River have been monitored by punch cards since 1966. During the quota years, 1966-1970, the punch card system was combined with an intensive creel census. Since 1971, punch cards have been the primary source of information.

Pertinent historical data are presented in Reports of Progress by Dunn (1961); Logan (1962, 1963, 1964); Engel (1965, 1966, 1967); Redick (1968); McHenry (1969); Watsjold (1970); Nelson (1971, 1972a, 1972b), and Hammarstrom (1974).

During 1974, distribution of punch cards to vendors was delayed until two weeks prior to the opening data of the three weekend fishery in hopes of reducing the number of cards that were picked up by potential anglers yet never used. Approximately 16,000 cards were distributed to vendors throughout South Central Alaska, of which 11,309 went to potential anglers. This represents a decrease of 6.3% from 1973. To date 57.2% of the cards issued to anglers have been voluntarily returned. This is a reduction of 2.5% from 1973. A summary of punch cards issued and returned is presented in Table 8.

Table 4. Rehabilitation Summary of Kenai Peninsula Lakes Stocked with Rainbow Trout and Sampled with Gill Nets and/or Electroshocking, 1974.

<u>Lake</u>	<u>Date Rotenoned</u>	<u>Date Stocked</u>	<u>Origin</u>	<u>Fish/lb.</u>	<u>Fish/Acre</u>	<u>Total Stocked</u>
Cabin	6/18/70	9/11/70	Winthrop, Washington	165	420	24,000
		6/ 4/71	Ennis, Montana	114	250	14,300
		6/20/73	Ennis, Montana	129	228	13,000
Jerome	6/28/68	8/27/68	Winthrop, Washington	210	525	8,550
		9/ 5/69	Winthrop, Washington	132	220	3,600
		9/11/70	Winthrop, Washington	106	200	3,200
		6/11/71	Ennis, Montana	158	220	3,600
		8/ 3/72	Winthrop, Washington	449	220	3,600
		6/20/73	Ennis, Montana	129	220	3,600
		7/19/74	Winthrop, Washington	341	245	4,000
Johnson	9/11/72	6/20/73	Ennis, Montana	129	256	21,800
Hump		6/ 4/71	Ennis, Montana	114	500	9,000
Island		6/ 7/71	Ennis, Montana	116	125	33,500
Longmare	9/ 7/72	6/20/73	Ennis, Montana	129	470	81,100
		8/24/73	Ennis, Montana	62	270	47,000
		7/17/74	Winthrop, Washington	341	200	34,400
Rainbow (Fetus)		6/28/71	Oregon	2,984	600	9,000
		7/ 3/74	Winthrop, Washington	728	507	7,600
Sport	7/23/65	7/ 7/66	Winthrop, Washington	1,160	400	29,000
		8/27/68	Winthrop, Washington	210	400	29,000
		6/ 4/71	Ennis, Montana	114	315	22,800
		6/11/71	Ennis, Montana	158	95	6,800
Tirmore (Shortpine)	9/ 8/72	7/26/73	Ennis, Montana	112	150	7,800
		7/26/73	Winthrop, Washington	125	150	7,800
Vagt	9/18/73	7/ 3/74	Winthrop, Washington	728	610	26,200

Table 3. Summary of 1974 Sampling of Kona Peninsula Lakes Stocked with Rainbow Trout.

Lake	Date Sampled	Method	Species(1)	Sample Number	Catch Per Hour	Length Range mm	Mean Length mm	Weight Range lbs.	Mean Weight lbs.	Year Planted
Cabin	10/ 4/74	Gill Net	RB	11	0.21	372-412	391.6	1.19-2.28	1.63	1970
			RB	18	0.35	286-353	313.6	0.65-1.20	0.86	1971
			RB	3	0.06	110-120	113.6	0.03-0.05	0.04	1973
Jerome	10/ 1/74	Gill Net	RB	18	0.59	338-414	374.6	1.18-2.00	1.72	Prior to 1974
			RV	119	2.59	100-160	141.7	-	0.05	1974
			DV	52	1.13	225-490	396.3	0.31-3.15	1.98	(2)
Johnson	10/ 7/74	Gill Net	RB	32	0.66	265-330	306.9	0.55-1.00	0.76	1973
	10/ 7/74	Electro Fishing	RB	26	26.00	260-320	286.5	0.50-1.04	0.69	1973
Hump	10/ 6/74	Gill Net	RB	1	0.04	485	-	3.73	-	1971
Island	10/ 7/74	Gill Net	RB	5	0.12	555-630	590.0	5.00-8.00	6.50	1969 & 1971
			RS	2	0.05	235-370	302.5	0.33-1.48	0.91	(2)
Longmare	10/ 9/74	Gill Net	RB	167	3.41	183-292	242.7	0.14-0.60	0.35	1973
			RB	62	1.27	97-128	115.1	0.03-0.06	0.04	1974
			SS	11	0.22	217-260	247.4	0.23-0.40	0.35	1973
	10/17/74	Electro Fishing	RB	38	42.00	194-287	236.2	0.23-0.71	0.35	1973
			RB	51	57.00	79-135	107.8	0.01-0.06	0.03	1974
			SS	2	2.00	232-252	242.0	0.30-0.38	0.34	1973
Rainbow (Fetus)	10/ 1/74	Gill Net	RB	6	0.13	435-500	472.0	2.50-3.63	3.11	1971
			RB	130	2.71	100-178	146.8	-	0.09	1974
Sport	10/ 9/74	Gill Net	RB	12	0.25	347-510	456.0	2.00-4.27	3.06	1971
Tirmore	5/20/74	Electro Fishing	RB	65	65.00	110-262	173.8	0.05-0.41	0.16	1973
(Short Pine)	10/ 4/74	Gill Net	RB	50	0.40	265-380	336.7	0.72-1.62	1.20	1973-(2)
			SS	12	0.10	195-262	215.2	0.22-0.42	0.30	(2)

(1) RB - Rainbow Trout
DV - Dolly Varden
RS - Sockeye Salmon
SS - Coho Salmon

(2) Fish probably introduced by private parties illegally.

Table 6. Summary of Kenai Peninsula Lakes Stocked with Coho Salmon and Sampled by Gill Nets and/or Electrofishing, 1974.

<u>Lake</u>	<u>Date Stocked</u>	<u>Origin</u>	<u>Fish/lb.</u>	<u>Fish/Acre</u>	<u>Total Stocked</u>
Arc	7/19/74	Seward	344	260	4,100
Bernice	7/26/63	Kodiak	256	100	12,400
	7/19/74	Seward	344	100	13,400
Portage	7/26/73	Kodiak	256	300	8,300
Rock	7/26/73	Kodiak	256	210	2,000
	7/19/74	Seward	344	160	1,500
Scout	8/ 3/72	Seward	445	250	23,800
Sunken Island	6/28/71	Seward	391	200	28,000
	7/26/73	Kodiak	256	200	28,000
Upper Jean	7/26/73	Kodiak	256	250	11,500

Table 7. Sampling Summary of Kenai Peninsula Lakes Stocked With Coho Salmon, 1974.

<u>Lake</u>	<u>Date Sampled</u>	<u>Method</u>	<u>Species *</u>	<u>Sample Number</u>	<u>Catch Per Hour</u>	<u>Length Range mm</u>	<u>Mean Length mm</u>	<u>Weight Range lbs.</u>	<u>Mean Weight lbs.</u>	<u>Year Planted</u>
Arc	9/25/74	Gill Net	RB	3	0.06	378-527	466.3	1.42-3.62	2.74	1969-1973
			SS	139	2.90	97-120	106.4	-	0.03	1974
Bernice	10/ 6/74	Gill Net	SS	52	2.30	108-161	139.1	0.04-0.14	0.09	1974
Portage	10/11/74	Gill Net	SS	81	1.64	104-214	156.8	0.03-0.21	0.10	1973
Rock	10/ 4/74	Gill Net	SS	118	1.27	100-164	128.5	0.03-0.13	0.07	1974
Scout	9/27/74	Gill Net	SS	110	2.29	170-301	214.2	0.08-0.74	0.27	1972
	9/26/74	Electro Fishing	SS	25	25.00	164-216	185.3	0.08-0.32	0.19	1972
Sunken Island	10/11/74	Gill Net	SS	36	0.72	163-285	203.8	0.10-0.63	0.22	1973
Upper Jean	10/ 3/74	Gill Net	SS	238	3.90	138-373	202.9	0.05-1.45	0.27	1973
	10/ 3/74	Electro Fishing	SS	42	47.00	120-248	154.1	0.05-0.35	0.11	1973

* RB - Rainbow Trout
SS - Coho Salmon

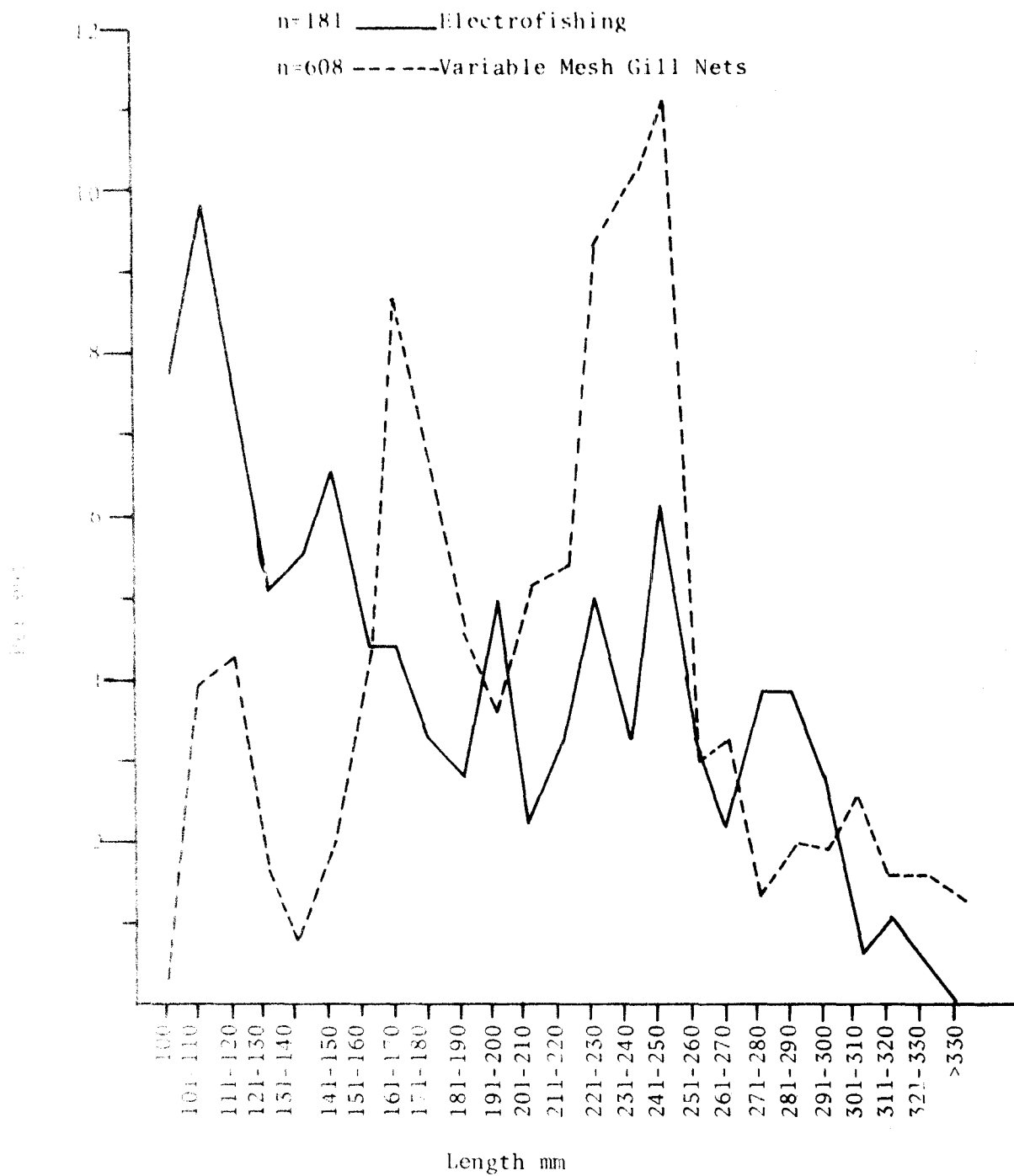


Figure 9 Length Frequency Comparison for Rainbow Trout and Coho Salmon Captured by Electrofishing and Gill Nets in Four Kenai Peninsula Lakes, 1974.

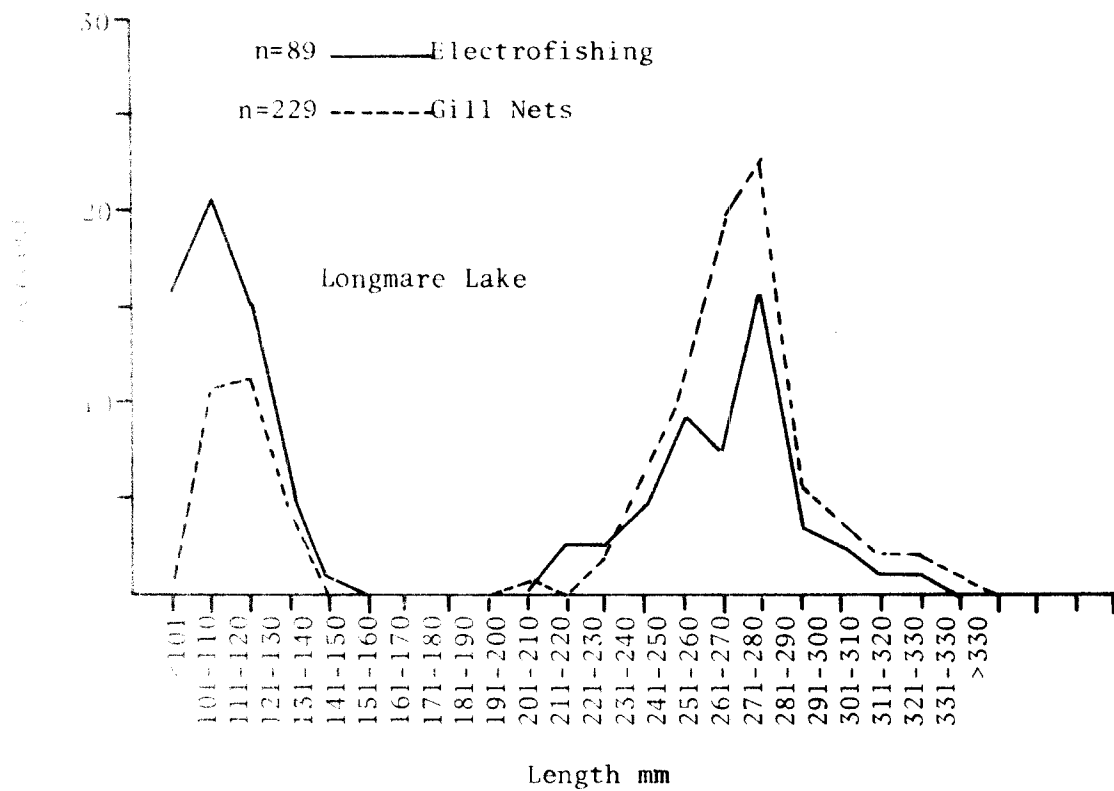
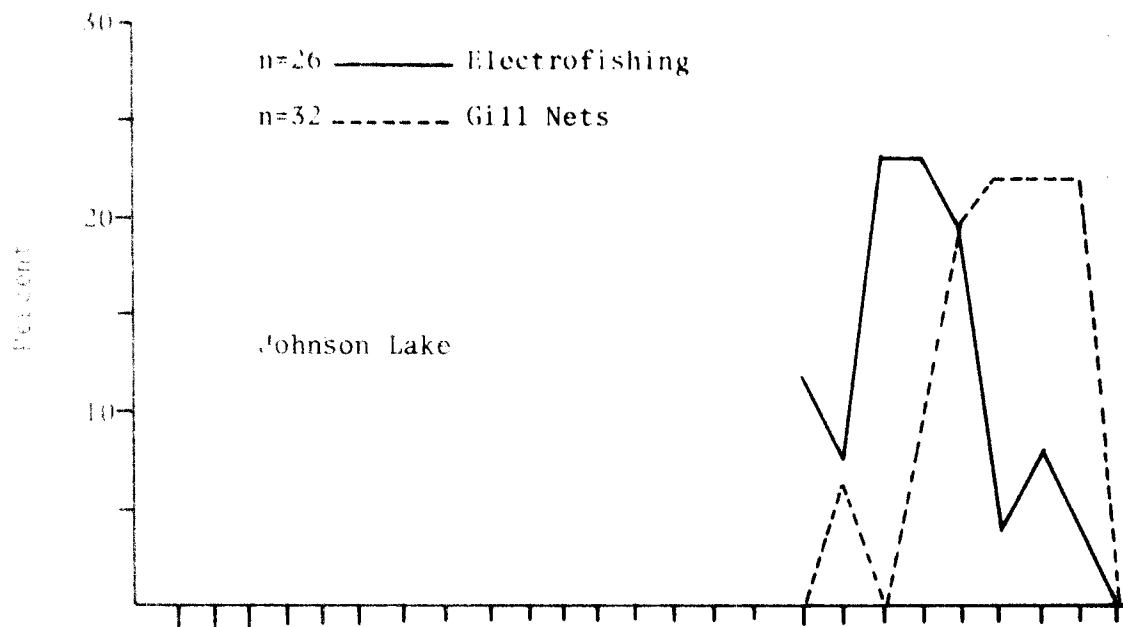


Figure 10. Comparative Length Frequency Data from Two Lakes Stocked With Rainbow Trout Sampled by Gill Nets and Electrofishing on Kenai Peninsula, 1974.

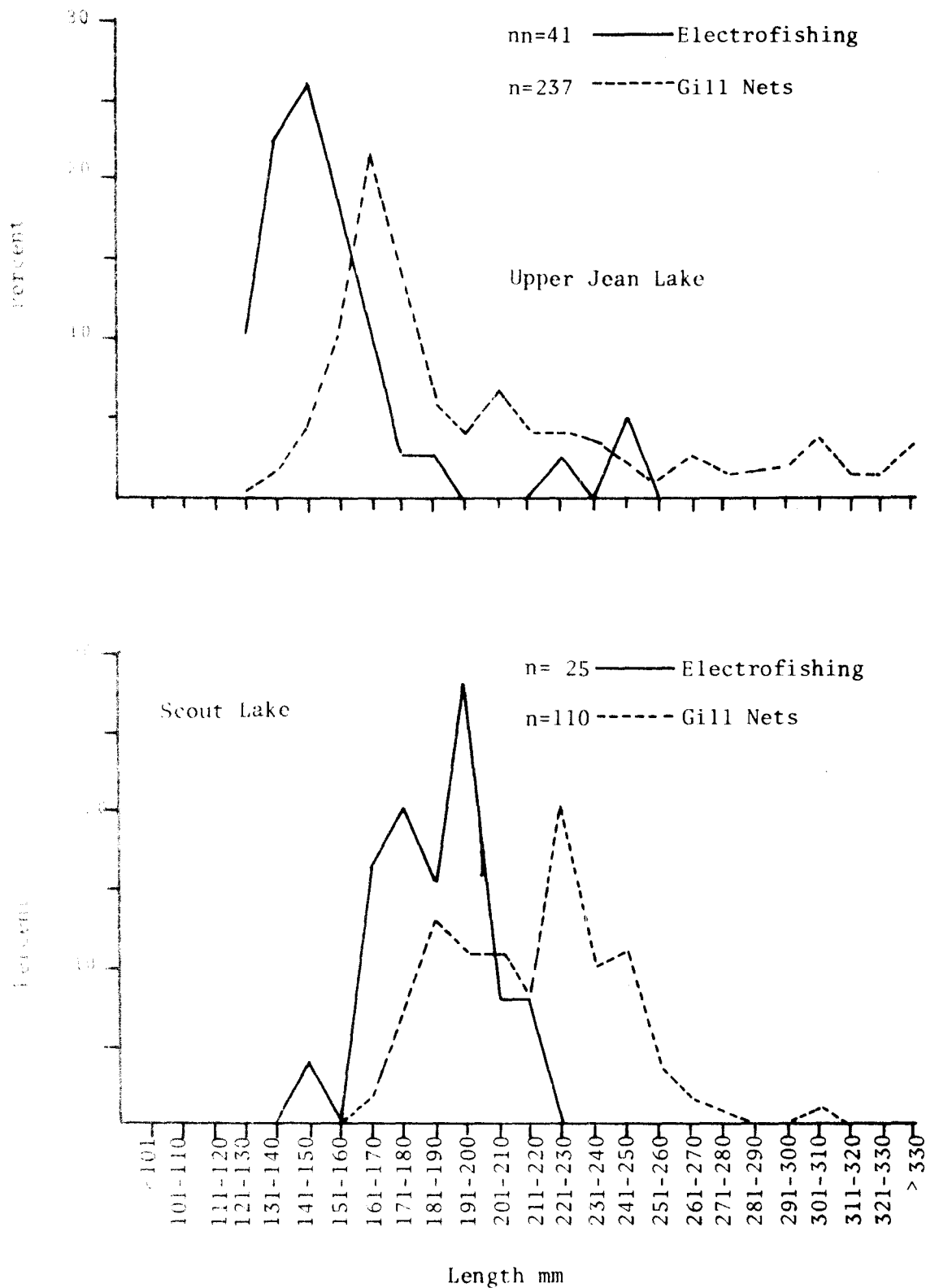


Figure 11. Comparative Length Frequency Data from Two Lakes Stocked with Coho Salmon and Sampled by Gill Nets and Electrofishing on the Kenai Peninsula, 1974.

Table 8. Summary of Chinook Salmon Punch Cards Issued and Returned, 1966-1974.

<u>Year</u>	<u>Number Issued</u>	<u>Number Returned</u>	<u>Percent Returned</u>
1966	8,853	6,835	77.2
1967	5,977	4,909	82.1
1968	9,524	6,724	70.6
1969	6,680	4,651	69.6
1970	16,687	12,518	75.0
1971	23,419	10,435	44.6
1972	23,991	10,138	42.2
1973	17,069	7,188	59.6
1974	11,039	6,465	57.2

Harvest data was determined from two sources, punch card returns and a telephone survey of non-returnees. The 1974 harvest is estimated at 1,086 chinook salmon, O. tshawytscha: Anchor River - 443, Deep Creek - 290, and Ninilchik - 353.

Information derived from punch cards is similar for 1973 and 1974; respectively, 53.4% and 56.8% of the anglers who returned cards reported they had fished in one of the three streams. Anglers who did fish reported that 19.1% were successful, up 12.9% from 1973. Analysis of cards returned is presented in Table 9 along with the results of the telephone survey. It is estimated that 5,712 anglers fished for chinook salmon during the punch card fishery.

Of the 875 anglers estimated to have been successful, 664 (75.9%) caught one fish, 211 (24.1%) caught the season limit of two chinook salmon. Anchor River was the most productive of the three streams, providing 40.8% of the harvest, while Deep Creek and Ninilchik River contributed 26.7% and 32.5%, respectively (Table 10). A summary of harvest by date is presented in Table 11.

The telephone survey was conducted as a follow-up to last year's survey and procedures used were identical to those reported by Hammarstrom (1973). The contacts were increased from 360 to 546, yet the degree of accuracy did not change substantially. Results of the survey were similar. Because telephone numbers were listed on punch card forms, the work load was reduced from that required by the survey conducted in 1973. The results of the telephone survey were then applied directly to the entire number of people who had not returned cards. The results appear in Table 12.

An interesting aspect of punch card analysis is angler residency. Who utilizes the fishery and who is successful? Residents of Homer are the most successful. Table 13 lists the success rates and percent of anglers utilizing the fishery for various residencies during 1973 and 1974.

Table 9. Summary of Data as Determined by Punch Cards and Telephone Survey, 1974.

Total Cards Issued by Vendors		11,309
	<u>Number</u>	<u>Percent</u>
Punch Cards Returned		
Successful Anglers	701	10.9
Unsuccessful Anglers	2,973	46.0
Did Not Fish	2,257	34.9
Incomplete Information	<u>534</u>	<u>8.2</u>
Total	6,465	100.0
Telephone Survey		
Successful Anglers	146	3.1
Unsuccessful Anglers	1,884	39.1
Did Not Fish	<u>2,786</u>	<u>57.8</u>
Total	4,816	100.0
Creel Checked But No Punch Card Returned		28
Totals Returned and Not Returned		
Successful Anglers	875	7.7
Unsuccessful Anglers	4,857	43.0
Did Not Fish	5,043	44.6
Incomplete Information	<u>534</u>	<u>4.7</u>
Total	11,309	100.0

Daily fishing effort for each stream was determined from car counts, conducted at 10:00 a.m. each day of the fishery. Previous interviews determined 3.4 anglers per car. Car counts were multiplied by a factor of 3.4 to estimate the man-days of effort (Table 14). Historical effort since the quota system was discontinued appears in Table 15.

Creel census data included only those fishing around the mouth of the stream and in the stream itself. Anglers fishing beyond a one-mile radius were not affected by the punch card fishery.

As all punch cards were not returned, the harvest of 1,086 king salmon over 20 inches is projected from data available. This figure includes 869 fish reported on punch cards, 189 fish extrapolated from the telephone survey, and 28 fish that were creel checked but not reported on returned cards. A minimum harvest would be 924; 869 from the punch card returns, 28 from the creel census, and 27 from the lower limits of the telephone survey. A maximum harvest would be 1,247; utilizing the upper limits of the telephone survey would indicate a catch of 350 by non-returnees. Therefore, it is assumed the projected harvest of 1,086 approximates actual harvest.

Escapement surveys were conducted during the latter part of July and early August. Index areas previously established were ground surveyed while a simultaneous aerial survey was conducted over the entire length of the stream. The ratio of aerial observed spawners to foot observed spawners over the index area of each stream was then applied to the aerial count for the entire stream. Each stream was surveyed twice, once by helicopter and once by Super Cub. On all three streams the helicopter proved to be a more accurate vehicle to utilize on aerial surveys than the Super Cub. A higher percentage of the ground count was observed from the helicopter than from the Super Cub; 70% and 38%, respectively.

More spawners were counted by helicopter in the index area in Ninilchik River than were observed by the ground survey. The topography of this stream lends itself to the helicopter survey. It is a meandering stream with little foliage cover. The cut banks often hid fish from the foot surveyor, yet the vibrations from the helicopter spooked the fish from under the banks to the center of the stream. The highest count on each stream was used as the estimated escapement figure. Historical harvest and escapement figures are presented in Table 16.

Saltwater Fishery:

Monitoring continued for the third year of the marine fishery that has developed near Deep Creek. The creel census was continuous from May 20 to August 4. A total of 897 interviews and 194 instantaneous boat counts were conducted. An additional 105 instantaneous counts at places other than Deep Creek revealed 85 boats (0.81 boats per count). The additional counts substantiated what has been indicated by prior data; fishing pressure at locations other than Deep Creek is so slight as to assume negligible harvest.

Due to the timing of two distinct runs, May 20 to July 1, and July 2 to August 4, the season has been divided into two corresponding periods. Fishing was slightly better during the early run with an estimated harvest of 514 fish. Late run harvest was estimated at 91 fish. Although these figures seem to indicate a stronger early run the calculated catch per hour was .038 and .034 for early and late runs, respectively.

Harvest and effort in 1974 were reduced substantially from 1973 by 41% and 38%, respectively. The reduction in harvest and effort can be directly attributed to weather conditions. Wind and rough seas were prevalent during 1974. Of 55 days the creel census was actually conducted, eight days (14.5%) were recorded as zero effort days when no boats got off the beach because of weather conditions. On 23 other days less than five boats were recorded as having fished. It is concluded weather reduced the available fishing time to roughly 45% of the season.

The marked difference between weekend fishermen and weekday fishermen noted in 1973 was not observed in 1974. Weekend anglers harvested 52% of the catch while weekday anglers harvest 48%. There were higher per day effort figures for weekends but catch per hour differed only .003 for both runs. Summary of data collected is presented in Table 17.

Kenai River Creek Census:

Because of a rapidly expanding chinook salmon fishery on the Kenai River, a creel census was conducted on a ten mile segment of stream from Naptowne Rapids to Skilak Lake from June 1-August 31. Chinook salmon fishing closes July 31, but the census was continued through August to determine the contribution of other species to the fishery.

Data was tabulated by month and is presented in Table 18. Although it is thought there are two distinct runs into the Kenai River, data from the creel census was inconclusive in determining specific dates. Fishing success in July was markedly better than in June.

Weekday anglers experienced more competition and less fish than did the weekend angler. Total weekday harvest is estimated at 867 (61.5%) chinook salmon while 542 (38.5%) represents the weekend catch. Average effort per day was 123.9 and 335.1 man-days for weekdays and weekends, respectively. Weekday catch per angler/hour was double that of weekend anglers, .037 and .018, respectively. Data calculated for weekends and weekdays are presented in Table 19.

Total harvest and effort figures for the portion of river open to chinook salmon fishing are unknown but limited aerial surveys led the author to believe that effort downstream, from the Soldotna Bridge to Beaver Creek (approximately 10 miles) was at least equal to, if not greater than, that in the creel census area. Reports from anglers indicate a substantial harvest from this lower stretch of river. A creel census is planned for this river section next year.

Table 10. Summary of Successful Anglers Fishing Chinook Salmon on Lower Three Kenai Peninsula Streams, 1974.

	Ninilchik River			Deep Creek			Anchor River			Total		
	Number Anglers	% Number Anglers	Number Fish	Number Anglers	% Number Anglers	Number Fish	Number Anglers	% Number Anglers	Number Fish	Number Anglers	% Number Anglers	Number Fish
1 Fish Reported by P.C.	145	20.7	145	167	23.8	167	221	31.5	221	533	76.0	533
2 Fish Reported by P.C.	48	6.9	96	36	5.1	72	84	12.0	168	168	24.0	336
Subtotal	193	27.6	241	203	28.9	239	305	43.5	389	701	100.0	869
1 Fish by Phone Survey	49	33.6	49	27	18.5	27	27	18.5	27	103	70.6	103
2 Fish by Phone Survey	27	18.4	54	8	5.5	16	8	5.5	16	43	29.4	86
Subtotal	76	52.0	103	35	24.0	43	35	24.0	43	146	100.0	189
Fish Creel Checked but not Reported by P.C.	9	32.1	9	8	28.6	8	11	39.3	11	28	100.0	28
Total	278	31.8	353	246	28.1	290	351	40.1	443	875	100.0	1,086
Percent Harvest		32.5			26.7			40.8			100.0	

Table 11. Chinook Salmon Harvest by Date and Weekend for Lower Three Kenai Peninsula Streams as Determined by Punch Card Returns, Phone Survey, and Creel Census.

Date	Ninilchik River		Deep Creek		Anchor River		Total	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
5/25	58	16.4	47	16.2	98	22.1	203	18.7
5/26	28	7.9	28	9.7	31	7.0	87	8.0
6/ 1	75	21.2	63	21.7	91	20.6	229	21.1
6/ 2	35	10.0	27	9.3	32	7.2	94	8.7
6/ 8	108	30.6	91	31.4	139	31.4	338	31.1
6/ 9	49	13.9	34	11.7	52	11.7	135	12.4
Total	353	100.0	290	100.0	443	100.0	1,086	100.0
1st weekend	86	24.4	75	25.9	129	29.1	290	26.7
2nd weekend	110	31.2	90	31.0	123	27.8	323	29.7
3rd weekend	157	44.4	125	43.1	191	43.1	473	43.6
Total	353	100.0	290	100.0	443	100.0	1,086	100.0

Table 12. Results of Telephone Survey Conducted on Chinook Salmon Punch Card Non-Returnees in 1973 and 1974.

	Number		Percent		Mean
	1974	1973	1974	1973	
Did Not Fish	314	188	57.5	52.2	55.4
Fished Unsuccessfully	215	164	39.4	45.6	41.8
Fished Successfully	17	8	3.1	2.2	2.8
Total	546	360	100.0	100.0	100.0

Table 13. Residencies and Success Rates of Anglers from Various Areas as Determined by Punch Card Returns, 1973-1974.

Residency	Percent of Total Returns		Percent Successful	
	1974	1973	1974	1973
Anchorage	58.9	56.6	9.0	5.1
Elmendorf, AFB	10.9	11.8	11.0	6.8
Homer	6.0	4.9	26.0	18.9
Fort Richardson	5.8	7.5	13.6	5.5
Kenai	5.0	5.0	8.0	3.9
Soldotna	3.9	3.2	7.1	4.8
Eagle River	2.2	2.0	9.9	6.2
Anchor Point	1.7	0.9	16.7	12.3
Palmer	1.1	0.8	10.0	5.5
Other Residents	2.0	4.1	21.1	6.8
Non-Residents	2.5	3.2	13.5	9.6
Total	100.0	100.0	10.8	6.2

Table 14. Minimum Fishing Effort Estimates on Lower Three Kenai Peninsula Streams During Chinook Salmon Fishery.

Date	Ninilchik River		Deep Creek		Anchor River		Total	
	Cars	Man-Days	Cars	Man-Days	Cars	Man-Days	Cars	Man-Days
5/25	273	928	327	1,112	228	775	828	2,815
5/26	215	731	256	870	225	765	696	2,366
6/ 1	100	340	127	432	196	666	423	1,438
6/ 2	53	180	139	473	135	459	327	1,112
6/ 8	107	364	206	700	126	428	439	1,492
6/ 9	89	303	189	643	98	333	376	1,279
Total	837	2,846	1,244	4,230	1,008	3,426	3,089	10,502
% Effort		27.1		40.3		32.6		100.0
% Harvest		32.5		26.7		40.8		100.0

Table 15. Minimum Fishing Effort Estimates During Chinook Salmon Punch Card Fishery on Lower Three Kenai Peninsula Streams, 1971-1974.

Year	Man-Days	Length of Season Day	Average Effort/Day	Percent Increase
1971	7,950	6	1,325	--
1972	6,757	4	1,689	27.5
1973	12,053	6	2,008	18.9
1974	10,502	6	1,750	-12.8

Table 16. Historical Harvest and Escapement Data (1966-1973) for Lower Three Kenai Peninsula Streams Compared to 1974 Chinook Salmon Data.

Year	Anchor River			Deep Creek			Ninilchik River			Total		
	Harvest	Escapement	% Harvest	Harvest	Escapement	% Harvest	Harvest	Escapement	% Harvest	Harvest	Escapement	Total Run
1966	290	1,330	17.9	50	540	8.5	220	670	24.7	560	2,540	3,010
1967	240	1,200	16.7	180	270	40.0	120	360	25.0	540	1,830	2,370
1968	250	530	32.0	160	200	44.4	210	450	31.8	620	1,190	1,800
1969	80	1,800	4.3	40	960	4.0	130	760	14.6	250	3,520	3,770
1970	170	1,850	8.4	60	-	-	280	-	-	510	1,850*	2,360*
1971	60	1,220	4.7	40	-	-	140	-	-	240	1,220*	1,460*
1972	180	1,890	8.7	140	530	20.9	170	1,360	11.1	490	3,780	4,270
1973	330	1,660	16.6	140	220	38.9	300	640	31.9	770	2,520	3,290
Mean	200	1,430	12.2	120*	450*	20.7*	190*	710*	21.3*	540*	2,560*	3,100*
1974	440	1,000	30.5	290	740	28.2	350	510	40.7	1,080	2,250	3,330

* 1970 and 1971 data not included because stream conditions precluded escapement counts.

Table 17. Summary of Data Collected During 1974 Deep Creek Creel Census Comparing Weekend and Weekdays for Early and Late Chinook Salmon Runs.

	<u>Number of Days</u>	<u>Anglers Interviewed</u>	<u>King Salmon Reported</u>	<u>Hours Reported</u>	<u>Projected Catch/Hour</u>	<u>Average Hours Fished/Angler</u>	<u>Estimated Harvest</u>	<u>Estimated Effort Man-Days</u>	<u>Average Effort/Day</u>	<u>Average Catch/Day</u>
Weekend Days										
Early Run	13	384	41	1,212.0	.034	3.16	272	1,700	130.8	20.9
Weekday Days										
Early Run	29	287	31	730.5	.042	2.55	232	2,111	72.8	8.0
Total Early Run	42	671	72	1,942.5	.037	2.89	514	3,811	90.7	12.2
Weekend Days										
Late Run	12	121	13	318.5	.041	2.63	39	424	35.3	3.3
Weekday Days										
Late Run	24	105	8	300.0	.027	2.86	52	856	35.7	2.2
Total Late Run	36	226	21	618.5	.034	2.74	91	1,280	35.5	2.5
Total Both Runs										
Weekends	25	505	54	1,530.5	.035	3.03	311	2,124	85.0	12.4
Total Both Runs										
Weekdays	53	392	39	1,030.5	.038	2.63	284	2,967	56.0	5.4
Total	78	897	93	2,561.0	.036	2.86	595	5,091	65.3	7.6

The area between the Soldotna Bridge and Naptowne Rapids displayed little angler activity on aerial surveys except for the area at the confluence of Moose River where considerable shore angling for sockeye salmon takes place. Effort for chinook salmon is believed negligible in this river area.

The creel census was primarily directed toward chinook salmon but catches of all species were recorded. August proved to be the best month in terms of overall success, due to a heavy contribution of the even year pink salmon, O. gorbuscha, run. It is felt the sockeye salmon catch will decrease next year due to the adoption of an anti-snagging regulation by the Board of Fish and Game (snagging or attempting to snag will be prohibited in 1975).

Weights were recorded by the Soldotna Chamber of Commerce through a chinook salmon derby. Fish entered numbered 334 and weighed 11,500 lbs. for an average weight of 34.4 lbs.

Age Composition:

Scales and length data were collected during both the punch card fishery and the Kenai River creel census. Insufficient scales were taken from the marine fishery off Deep Creek to be analyzed. Data available indicate that chinook salmon originating in the Kenai River are larger than those found in the lower three streams. Length comparisons appear in Table 20 and Figure 12. The majority of fish from the Kenai River were progeny of the 1968 brood year. Fish from the lower three streams were more evenly distributed through three brood years: 1968, 1969, and 1970. Age structure for the two fisheries is presented in Table 21.

It is of interest to note the high percentage of two-ocean jacks taken in the punch card fishery. During the 1973 fishery a high number of one-ocean jacks were reported verbally by anglers although they were not required to be reported on a punch card. It will be interesting to follow this age class to determine if the incidence of jacks in the fishery is indicative of a strong year class.

Historical data from the lower three streams was examined to determine return per spawner for the brood years 1960-1968. Each return was broken into its calculated age groups then totaled as to which returned as three-year-olds, four-year-olds, etc. A ratio between escapement and total return was calculated. Data are presented in Tables 22 and 23.

Although the regression is not conclusive it does lend credence to the theory that these streams are being managed at carrying capacity. The three weekend fishery allows sufficient harvest without endangering the escapement.

Arctic Grayling Population Estimate

Bench Lake is located in a mountain pass at an elevation of 1,450 feet and is accessible by United States Forest Service trail 8 miles from Granite

Table 18. Summary of Catch Data on the Kenai River Between Skilak Lake and Naptowne Rapids as Determined by Creel Census During 1974.

	Chinook Salmon		Sockeye Salmon		Pink Salmon		Coho Salmon		Rainbow Trout		Dolly Varden		Total All Species	
	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest	Catch/hr	Estimated Harvest
June	.018	483	.001	18	.000	0	.000	0	.061	1,560	.063	1,773	.111	3,834
July	.029	926	.059	1,411	.002	40	.001	27	.011	307	.052	1,596	.112	4,307
August	.000	0	.018	457	.139	2,582	.050	913	.008	124	.067	1,138	.282	5,194
Total	.024	1,409	.039	1,866	.060	2,622	.022	940	.026	1,991	.060	4,507	.156	13,335

Table 19. Summary of Creel Census Data Regarding Chinook Salmon Comparing Weekends and Weekdays on the Kenai River between Skilak River and Naptowne Rapids, 1974.

	Number of Days	Anglers Interviewed	Hours Reported	King Salmon Reported	Projected Catch/Hour	Average Hours Fished/Angler	Estimated Harvest	Estimated Effort
June Weekdays	20	131	584	20	.034	4.45	248	1,905
June Weekends	10	415	1,970	26	.013	4.75	235	3,620
June Total	30	546	2,554	46	.018	4.68	483	5,525
July Weekdays	22	286	1,321	50	.038	4.62	619	3,297
July Weekends	9	413	1,916	45	.023	4.64	307	2,746
July Total	31	699	3,237	95	.029	4.63	926	6,043
Weekday Total	42	417	1,905	70	.037	4.57	867	5,202
Weekend Total	19	828	3,886	71	.018	4.69	542	6,366
Total	61	1,245	5,791	141	.024	4.65	1,409	11,568

Table 20. Length Comparison for Chinook Salmon of Various Age Classes Taken from Lower Three Kenai Peninsula Streams and the Kenai River, 1974.

Location		Age Class			
		1.2	1.3	1.4	1.5
Lower Three Kenai	Range (mm)	710-750	730-1,090	845-1,145	
Peninsula Streams	Mean (mm)	615.4	832.9	990.2	
Kenai River	Range (mm)	525-674	805-1,003	915-1,325	1,140-1,312
	Mean (mm)	614.2	907.0	1,124.2	1,205.8

Table 21. Age Structure of Chinook Salmon Taken from the Lower Three Peninsula Streams and the Kenai River, 1974.

	Age									
	<u>1.1</u>	<u>1.2</u>	<u>1.3</u>	<u>1.4</u>	<u>1.5</u>	<u>2.1</u>	<u>2.2</u>	<u>2.3</u>	<u>2.4</u>	<u>Total</u>
Lower Three Peninsula Streams										
Number		50	32	71	1		3	2		159
Percent		31.4	20.1	44.7	0.6		1.9	1.3		100.0
Kenai River										
Number	1	5	4	71	5				1	87
Percent	1.1	5.8	4.6	81.6	5.8				1.1	100.0
	Brood Year									
	<u>1967</u>		<u>1968</u>		<u>1969</u>		<u>1970</u>		<u>1971</u>	
Lower Three Peninsula Streams										
Number	1		73		35		50			
Percent	0.6		46.0		22.0		31.4			
Kenai River										
Number	6		71		4		5		1	
Percent	6.9		81.6		4.6		5.8		1.1	

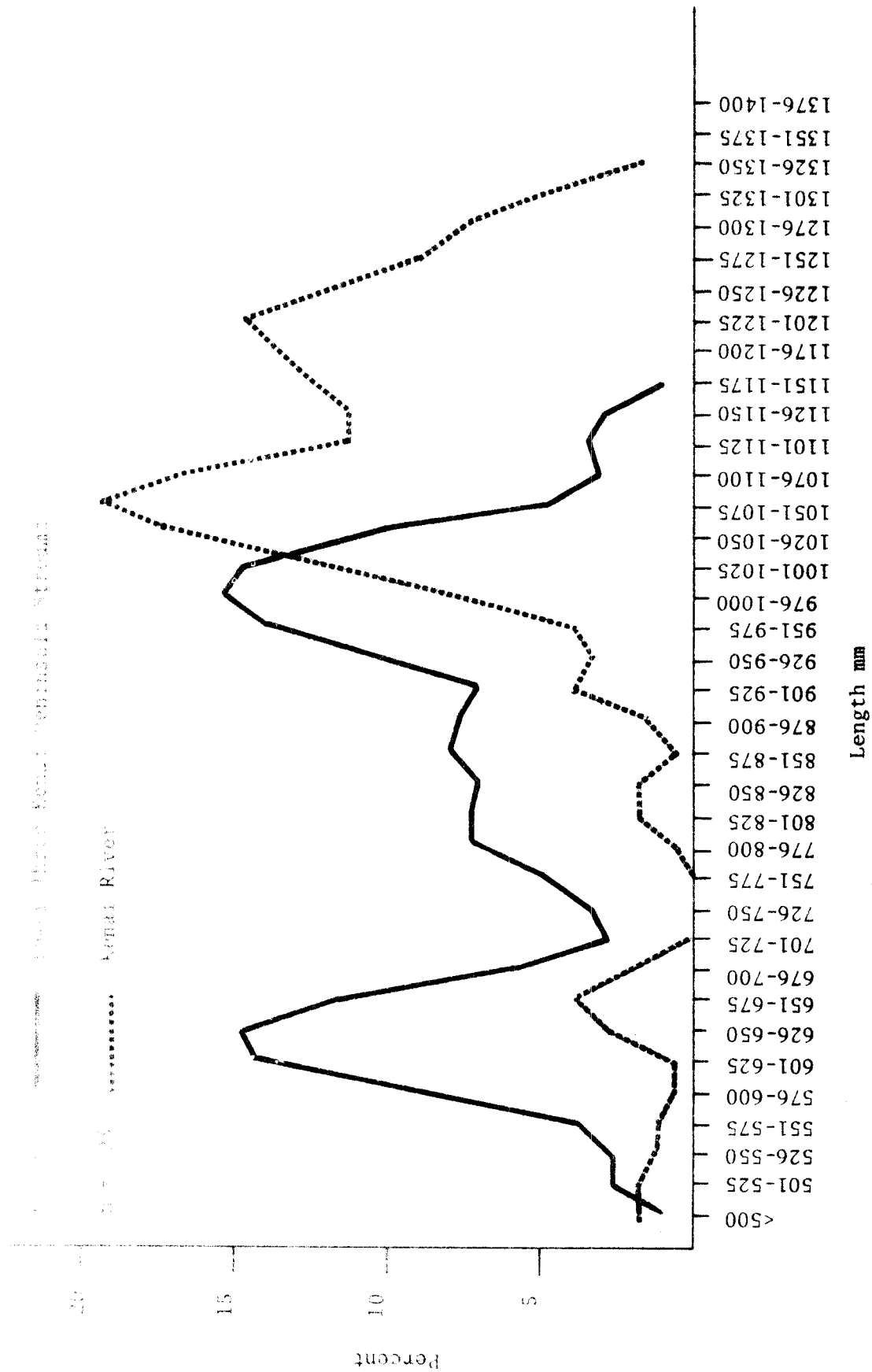


Figure 12. Length Frequency Comparison for Chinook Salmon Taken from Lower Three Kenai Peninsula Streams and Kenai River, 1974. (graph smoothed by $\frac{a+2b+c}{2}$)

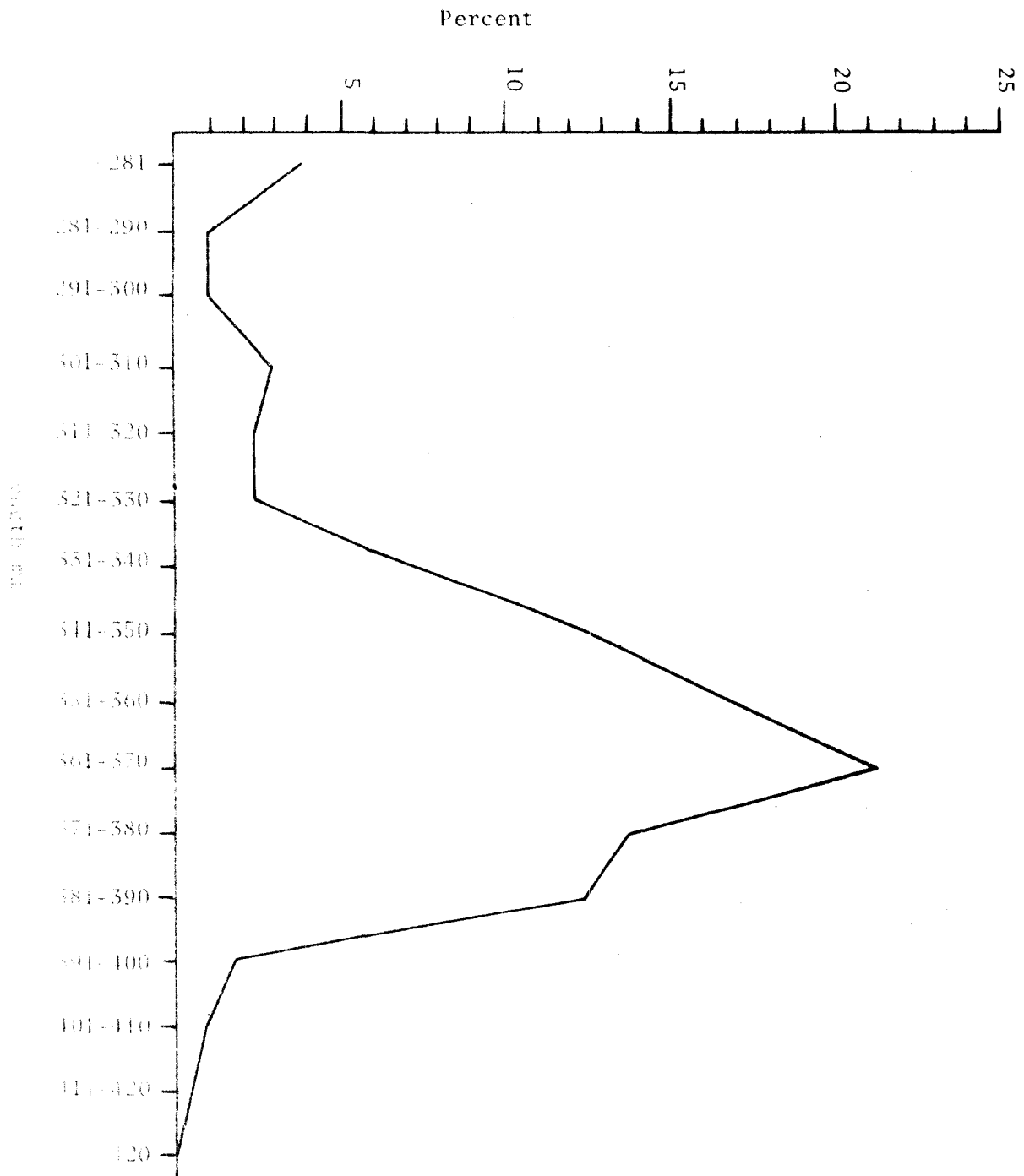


Figure 13. Length Frequency of Arctic Grayling Captured During the Spawning Period at the Outlet of Bench Lake, 1974.

Table 22. Summary of Calculated Chinook Salmon Returns Per Escapement in the Anchor River.

Brood Year	Escapement	Return Catch and Escapement by Age				Total Return from Brood Year	Return/ Spawner
		1.1	1.2	1.3	1.4		
1960	1,200	(1963) 253	(1964) 320*	(1965) 606*	(1966) 494	1,673	1.39
1961	850	(1964) 32*	(1965) 301*	(1966) 687	(1967) 952	1,974	2.32
1962	970	(1965) 30*	(1966) 311	(1967) 321	(1968) 362	1,024	1.06
1963	1,340	(1966) 42	(1967) 128	(1968) 242	(1969) 209	621	0.46
1964	1,700	(1967) 26	(1968) 162	(1969) 731	(1970) 551	1,470	0.86
1965	1,600	(1968) 5	(1969) 887	(1970) 1,098	(1971) 730	2,720	1.70
1966	1,330	(1969) 55	(1970) 370	(1971) 439	(1972) 828*	1,692	1.27
1967	1,200	(1970) 48	(1971) 110	(1972) 784	(1973) 1,438	2,380	1.98
1968	530	(1971) 30	(1972) 366	(1973) 441	(1974) 479	1,316	2.48

* Numbers calculated from averages because scale data are not available.

Table 23. Grouped Chinook Salmon Production Data for Anchor River, Brood Years 1960-1968.

Escapement	Range	Years	Production	
			Fish Returned/Spawner	Range
700*	530-850	2	2.48	2.65-2.31
1,100*	970-1,200	3	1.49	2.01-1.06
1,500*	1,330-1,700	4	1.07	1.70-0.46

* Rounded to nearest 100

Creek Campground and 11 miles from Moose Creek parking area. The lake was barren but in August 1967, the Alaska Department of Fish and Game transplanted 240 Age 1 Arctic grayling, Thymallus arcticus, from Crescent Lake. Shortly thereafter, the U. S. Forest Service diverted a glacial stream so that it entered the system approximately one mile downstream from the outlet of the lake. The diversion cleared the lake of turbid water and a self-sustaining grayling population has been established.

From May 28 through 30, 206 grayling were captured from the spawning grounds, tagged and released. All spawning was confined to the first mile of outlet stream. At that time a ground survey was conducted and an estimated 2,000 adults were observed. It was noted that very few fish were on the spawning grounds during the morning hours yet fish were readily captured with rod and reel in the lake during this period. About noon, adults were observed in the stream and a bag seine was set up so as to form a total barrier. The grayling were then chased into the bag and captured. While processing fish on shore, spawners were noted moving downstream. Later in the afternoon, many spawners were noticed on the downstream side of the seine, and when the seine was hauled in these fish moved upstream into the lake.

Approximately one month later, June 20-22, a tag recovery program was initiated. Variable mesh gill nets and rod and reel yielded 74 adult grayling, 7 were tagged. Using Bailey's modification of Petersen's direct proportion method (Richer, 1958), the total spawning population was estimated at 1,931. The estimate was calculated as $N=M(C+1)/R+1$, where M equals total tags released, C the total catch at recapture, R the number of tags recaptured, and N the population estimate.

Scales were taken from the first 100 fish captured in May. Age composition and length data determined from scale sampled fish are presented in Table 24. A length frequency curve for all fish tagged is presented in Figure 13.

Length figures for the various age classes are similar to those found by Engel (1973) for Crescent Lake spawners.

Table 24. Summary of Physical Characteristics of Arctic Grayling Captured During the Spawning Period at Outlet of Bench Lake, 1974.

<u>Age</u>	<u>n</u>	<u>Percent</u>	<u>Length Range (mm)</u>	<u>Length Mean (mm)</u>
II	2	2.1	175-180	117.5
III	6	6.2	220-355	301.6
IV	80	82.4	290-395	361.8
V	9	9.3	360-395	375.0
Total	97	100.0	175-395	355.5

Egg Take Program

Due to a policy of the Department of Fish and Game to restrict the importation of fish eggs, a program to establish a native Alaskan rainbow trout brood stock commenced in 1974. The Swanson River on the Kenai Peninsula was selected as one of the sources of eggs. In a cooperative program with the U. S. Fish and Wildlife Service, approximately 20,700 eggs were taken from 38 females of which an undetermined number were partially spent. Females ranged in length from 230-420 mm and averaged 316.9 mm, while males ranged from 165-485 mm and averaged 299.1 mm. The eggs were fertilized and flown to Fire Lake Hatchery for incubation and rearing.

Fish were captured by use of beach seines and an electric shocker at two bridges located four miles apart. These sites were selected because of the availability of fish and logistical reasons. The bridges were constructed for use by Swanson River Oil Field personnel. Through bridge construction, much gravel was placed in the stream bed and appears to provide spawning areas for rainbow trout. The program is scheduled to be continued through 1978.

Another egg take program involving the Sport Fish Division was that of aiding the Fisheries Rehabilitation, Enhancement and Development Division of the Department capturing pink salmon in the Kenai River. The electric shocking boat was employed and proved successful in glacial waters. During 12.1 hours of shocking, 1,078 adult pink salmon were captured, 947 of which were females yielding approximately 2 million eggs. Conductivity of the water was 64 micromhos per centimeter and the fish ranged from approximately 3-8 pounds.

For an undetermined reason, gravid females were more easily captured than either males or spent females. The males did not remain immobilized in the electric field for more than a few seconds, and spent females tended to remain near the bottom of the electrodes. Gravid females tended to come to the surface and remain motionless long enough for capture with long handled dip nets.

After the first three days of electrofishing, 425 fish had been captured and placed in holding pens to ripen, along with an undetermined number of fish that had been captured by gill nets. Two days later the pens were cleaned and sorted and only 14 mortalities occurred. It is unknown if the fish that died were captured by gill nets or electrofishing.

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Prepared by:

Approved by:

Steve Hammarstrom
Fishery Biologist

s/W. Michael Kaill, Chief
Sport Fish Research

s/Rupert E. Andrews, Director
Division of Sport Fish